

What is claimed is:

- 5 1. A computing device, comprising:
an LCD display;
an LCD housing configured to cover at least a portion of the LCD display;
a shock mount assembly configured to reduce impacts to the LCD display,
and to position the LCD display relative to the LCD housing, the shock mount
10 assembly including a plurality of shock mounts, which are attached to the LCD
display, and which rest in a portion of the LCD housing.
2. The computing device as recited in claim 1 wherein the LCD housing includes
a plurality of mounting holes, and wherein each of the plurality of shock mounts
15 includes a resilient member having a first segment and a second segment, the first
segment being larger than the second segment, the first segment being disposed
between the LCD display and the LCD housing and the second segment being
disposed inside one of the mounting holes.
- 20 3. The computing device as recited in claim 2 wherein the first segment fills a
gap formed between the LCD display and LCD housing, and wherein the second
segment fills the mounting hole of the LCD housing.
4. The computing device as recited in claim 3 wherein a distal end of the first
25 segment abuts to a side of the LCD display, a proximal end of the first segment abuts
to a side of the LCD housing, and an outer periphery of the second segment abuts to
an inner periphery of the mounting hole of the LCD housing.
5. The computing device as recited in claim 1 wherein a first set of shock mounts
30 are attached to a first side of the LCD display, and wherein a second set of shock
mounts are attached to a second side of the LCD display, the second side being
opposite the first side.

6. The computing device as recited in claim 1 wherein the shock mount assembly holds the LCD display in the X, Y and Z directions.

7. The computing device as recited in claim 1 wherein the LCD display includes an LCD panel and an LCD frame, the LCD frame being attached to the LCD panel and defining the side of the LCD display, and wherein the LCD housing includes a wall that is positioned substantially next to the side of the LCD display so as to form a gap therebetween.

8. The computing device as recited in claim 7 wherein the LCD housing wall includes a plurality of mounting holes, and wherein each of the plurality of shock mounts includes a resilient member having a first segment and a second segment, the first segment being larger than the second segment, the first segment being disposed between the LCD display and the LCD housing and the second segment being disposed inside one of the mounting holes.

9. The computing device as recited in claim 8 wherein a distal end of the first segment abuts to a side of the LCD frame, a proximal end of the first segment abuts to a side of the wall of the LCD housing, and an outer periphery of the second segment abuts to an inner periphery of the mounting hole of the wall of the LCD housing.

10. The computing device as recited in claim 9 wherein the shock mounts include a fastener for attaching the resilient member to the LCD frame.

11. The computing device as recited in claim 10 wherein the fastener is a screw.

12. A portable computer, comprising:

a structural member configured to support the portable computer;

an optical disk drive including drive components and structural components configured to support the drive components;

a shock mount assembly configured to reduce impacts to the optical disk drive, and to position the optical disk drive relative to the structural member, the shock mount assembly including a plurality of shock mounts, which are attached to

the structural components of the optical disk drive, and which rest in a portion of the structural member.

13. The portable computer as recited in claim 1 wherein the structural member includes a plurality of mounting holes, and wherein each of the plurality of shock mounts includes a resilient member having a first segment and a second segment, the first segment being larger than the second segment, the first segment being disposed between the structural component of the optical disk drive and the structural member and the second segment being disposed inside one of the mounting holes.

14. The portable computer as recited in claim 13 wherein the first segment fills a gap formed between the structural component of the optical disk drive and the structural member, and wherein the second segment fills the mounting hole of the structural member.

15. The portable computer as recited in claim 14 wherein a distal end of the first segment abuts to a side of the structural component of the optical disk drive, a proximal end of the first segment abuts to a side of the structural member, and an outer periphery of the second segment abuts to an inner periphery of the mounting hole of the structural member.

16. The portable computer as recited in claim 12 wherein a first set of shock mounts are attached to a first side of the structural component of the optical disk drive, and wherein a second set of shock mounts are attached to a second side of the structural component of the optical disk drive, the second side being opposite the first side.

17. The portable computer as recited in claim 12 wherein the shock mount assembly holds the optical disk drive in the X, Y and Z directions.

18. The portable computer as recited in claim 12 wherein the structural member is a portion of a computer enclosure that houses the internal components of the portable computer and a portion of a computer chassis used to support the computer enclosure, and wherein the structural component of the optical disk drive includes a plurality of

tabs that are positioned substantially next to a side of the computer enclosure and/or the computer chassis so as to form a gap therebetween.

19. The portable computer as recited in claim 18 wherein the computer enclosure and/or computer chassis includes a plurality of mounting holes, and wherein each of the plurality of shock mounts includes a resilient member having a first segment and a second segment, the first segment being larger than the second segment, the first segment being disposed between the tab of the structural component and the side of the computer enclosure or computer chassis and the second segment being disposed inside one of the mounting holes of the computer enclosure or computer chassis.

20. The portable computer as recited in claim 19 wherein a distal end of the first segment abuts to a side of the tab, a proximal end of the first segment abuts to a side of the computer enclosure or computer chassis, and an outer periphery of the second segment abuts to an inner periphery of the mounting hole of the computer enclosure or computer chassis.

21. The portable computer as recited in claim 20 wherein the shock mounts include a fastener for attaching the resilient member to the tab.

22. The portable computer as recited in claim 21 wherein the fastener is a screw.

23. The portable computer as recited in claim 12 wherein the optical disk drive is a CD/DVD drive.

24. The portable computer as recited in claim 23 wherein the CD/DVD drive is a slot loaded CD/DVD drive.

25. A portable computer, comprising:
a base having casing and a chassis, the casing being configured to house various components that provide computing operations for the portable computer, and the chassis being configured to support the casing, the casing and chassis having interior portions that define an enclosed region inside the base; and

an enclosureless optical disc drive having drive components and frame components configured to support the drive components, the enclosureless optical disc drive being disposed inside the enclosed region of the base, the enclosed region being arranged to surround a substantial portion of the enclosureless optical disc drive so as to shield the enclosureless optical disc drive from internal and external hazards.

26. The portable computer as recited in claim 25 wherein the chassis includes a plurality of ribs, and wherein at least one of the ribs forms a wall of the enclosed region.

27. The portable computer as recited in claim 26 wherein the casing includes a plurality of casing walls, and wherein at least one of the casing walls forms a wall of the enclosed region.

28. The portable computer as recited in claim 27 wherein the casing and chassis include a top wall for enclosing a top portion of the enclosureless optical disc drive, a bottom wall for enclosing a bottom portion of the enclosureless optical disc drive, a front wall for enclosing a front portion of the enclosureless optical disc drive, a first side wall for enclosing a first side portion of the enclosureless optical disc drive, a second side wall for enclosing a second side portion of the enclosureless optical disc drive, and a back wall for enclosing a back portion of the enclosureless optical disc drive.

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30. The portable computer as recited in claim 25 further comprising a thin flexible boot configured to surround at least a portion of the enclosureless optical disc drive so as to prevent particles from reaching the drive components.

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31. The portable computer as recited in claim 25 wherein the frame component includes a bottom plate and a top plate, the top plate being attached to the bottom plate via a plurality of structural arms extending therebetween, the bottom plate being configured to support the drive components, and the top plate being configured in part to block laser light from emitting from the enclosureless optical disc drive.

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32. The portable computer as recited in claim 25 wherein the internal portions of the casing and chassis that form the enclosed region are configured to shield electronic emissions therein.

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33. The portable computer as recited in claim 25 wherein the chassis is disposed within the portable computer enclosure.

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34. The portable computer as recited in claim 25 wherein the enclosed region shields the enclosureless optical disc drive from dust.

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35. The portable computer as recited in claim 25 wherein the enclosed region shields laser emissions.

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15 36. The portable computer as recited in claim 25 wherein the optical disk drive is a CD/DVD drive.

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The portable computer as recited in claim 36 wherein the CD/DVD drive is a slot loaded CD/DVD drive.

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38. A portable computer having an enclosure, comprising:
a structural member associated with the enclosure;
a heat producing element disposed inside the enclosure; and
a heat exchanger configured to thermally couple the heat producing element to the structural member,

25 whereby the heat from the heat producing element is spread throughout the structural member via the heat exchanger.

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The portable computer as recited in claim 38 wherein the structural member is a wall of the enclosure.

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40. The portable computer as recited in claim 39 wherein the wall of the enclosure is formed from a thermally conductive material.

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41. The portable computer as recited in claim 40 wherein the wall of the enclosure is formed from a metallic material.

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42. The portable computer as recited in claim 41 wherein the wall of the enclosure is formed from sheet metal.

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43. The portable computer as recited in claim 42 wherein the wall of the enclosure is formed from titanium sheet metal.

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10 44. The portable computer as recited in claim 38 wherein the structural member is a chassis used to support the enclosure.

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45. The portable computer as recited in claim 44 wherein the wall of the chassis is formed from a thermally conductive material.

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46. The portable computer as recited in claim 45 wherein the chassis is formed from a plastic material.

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20 47. The portable computer as recited in claim 46 wherein the chassis is formed from carbon fiber filled plastic.

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48. The portable computer as recited in claim 38 wherein the heat producing element is a computer chip.

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49. The portable computer as recited in claim 48 wherein the computer chip is selected from the group consisting essentially of a processor chip, graphics chip, cache chip or a bridge chip.

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30 50. The portable computer as recited in claim 38 wherein the heat exchanger comprises a heat sink that is thermally coupled to the heat producing element.

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51. The portable computer as recited in claim 50 wherein the heat sink includes a first side having a planar surface in thermal contact with the heat producing element, and a second side having plurality of heat dissipating fins extending therefrom.

51. The portable computer as recited in claim 50 wherein the heat sink is positioned adjacent to the structural member so as to create a thermal path between the heat producing element and the structural member.

52. The portable computer as recited in claim 50 wherein the heat sink is that is thermally coupled to the structural member so as to create a thermal path between the heat producing element and the structural member.

10 53. The portable computer as recited in claim 50 wherein the heat sink is integrated into the structural member so as to create a direct thermal path between the heat producing element and the structural member.

15 54. The portable computer as recited in claim 50 wherein the heat exchanger further comprises a heat pipe that is thermally coupled to the heat sink and the structural member, the heat pipe being adapted to transfer heat from the heat sink to the structural member.

20 55. The portable computer as recited in claim 55 wherein the heat pipe is permanently attached to the heat sink and the structural member.

25 56. The portable computer as recited in claim 55 wherein the heat sink includes a heat pipe receiving portion extending through the heat sink, and wherein a portion of the heat pipe is disposed within the heat pipe receiving portion.

30 57. The portable computer as recited in claim 57 wherein the heat sink includes a first side having a planar surface in thermal contact with the heat producing element, and a second side having plurality of heat dissipating fins extending therefrom, and wherein the heat pipe receiving portion is disposed between the first and second sides.

58. The portable computer as recited in claim 55 wherein the heat exchanger further comprises a fan unit for generating a flow of air, and wherein the heat sink is positioned proximate the airflow region such that the flow of air passes over the heat sink.

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The portable computer as recited in claim 38 wherein a plurality of heat producing elements are disposed inside the enclosure of the portable computer, and wherein the heat exchanger comprises a plurality of heat sinks and a heat pipe, the heat pipe being arranged to thermally couple each of the heat sinks to the structural member, each of the plurality of heat sinks being thermally coupled to one of the plurality of heat producing elements, whereby the heat from each of the heat producing elements is dissipated in part through the heat sink, and in part through the structural member via the heat sink and heat pipe combination.

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